

1 Thermophil ® INFRAsmart R 300 / R 301 / R 302

- Contactless measurement of Temperature for all applications.
- Sturdy and tight stainless steel housings to IP 64.
- Two-wire 4-20 mA technique
- HART® interface
- Choice of spectral ranges
- Variable measuring ranges
- Max. ambient temperature 70 °C



Application

The INFRAsmart R 300/301/302 family comprises stationary pyrometers for contactless measurement of temperature.

This technique is a big advantage, for example, if the object to be measured moves or is live. The contactless measuring principle also makes sense if the measured object is a poor conductor of heat (e.g. plastic films, paper or bulk materials) or if the measurement has to be completed quickly.

This results in a very broad range of applications, such as:

Thermoforming machines for plastics,
 Extruders for plastics,
 Calendaring lines for plastic films,
 Coating machines,
 Glassworking,
 Metalworking,
 Supervision of products on conveyor belts,
 Monitoring of plant overheating, etc.

Function

With the R 301 and R 302 types, the infrared radiation is focused on the sensing element by a lens. The R 300 type works with a high-gloss, gold-plated cone.

The pyrometers are extremely compact, with integrated electronic components that convert the measurement signal to 4...20 mA.

Cooling systems are available for operation at ambient temperatures higher than 70 °C.

An air purging nozzle can be supplied for dusty or damp environments to keep the lens or the cone clean.

Fixing brackets and various other accessories are also available.

Features

- Measuring ranges: 0...2000 °C in sub-ranges
- Measurement signal: 4...20 mA, linear
- Power supply: 12...30 V DC
- Smallest measuring field: 5 mm Ø
- Vibration-proof, no moving parts
- Interface: HART® protocol
- Cluster / category II2G Ex ib IIC T6 ... T4 for application in Ex zone 1 or zone 2
- Cluster / category II2D Ex ib IIIC T100 105°C/160°C for application in Ex zone 21 or zone 22
- IBExU06ATEX1089
- DTM and PDM for sensor management
- Temperature monitoring with ignition protection standard IPL 1, TÜV certificate no. 71332449

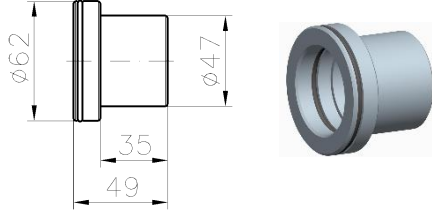
Technical data				
Measuring range				
Overall	max. 0...+400 °C with R 300			
	max. 0...+2000 °C with R 301/R 302			
Spectral response	8...14 µm; 2...2.7 µm; 4.9...5.5 µm; 7.9 µm (R 300)			
Emission factor	0.1 to 1, settable externally via the HART® interface			
Measuring field	Depending on distance (see "Distance ratio")			
Interface	HART® protocol (FSK BELL 202, 1.2 kbit/s)			
Functions (configurable via HART®-Interface)	Unit, Range limits, Emission factor, Transmission factor, Temperature alarm, Damping, Maximum and Minimum mode, Fault current, Fieldbus address			
Output (current interface)				
Output signal	4...20 mA, linear			
Permissible load	≤ 500 Ω for standard version/U _H = 24 V			
	Intrinsically safe circuit Ex ib IIC			
	max. input voltage	U _i = 28 V		
	max. input current	I _i = 105 mA		
	max. power input	P _i = 1,0 W		
	max. internal capacity	C _i = 12 nF		
	max. internal inductance	L _i = 0,2 mH		
Accuracy				
Measuring accuracy	≤ 1 % of measuring range (at 23 °C and for emission factor = 1)			
Temperature sensitivity	≤ 0.03 %/C°			
Response time	t _{0.9} = 0.2 s			
Ambient conditions				
Ex	Type	Ambient Temperature	Temperature class	max. Surface Temperature
	R30x	-20°C ... +60°C	T6	T ₁₀₀ 105°C
Permissible operating temperature	0...+70 °C			
Permissible storage temperature	-10...+70 °C			
Climatic class	KSF according to DIN 40040			
Power supply				
U _H = 12...30 V DC, max. 25 mA, max. residual ripple ≤ 150 mV rms				
Connection				
4-pole plug connector, degree of protection IP 64				
Mechanical data				
Type	R 300	R 301	R 302	
Housing material	Stainless steel (material no. 1.4301)			
Degree of protection	IP 64			
Weight	1100 g	1100 g	1460 g	

Dimensions		
R 300	R 301	R 302
Distance ratio		
R 300	R 301	R 302
Connection		
With plug connector	External view/ connector soldering side	Plug connector R 300/301/302 Evaluator 4...20 mA Power Shield

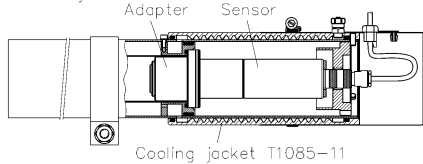
Accessories

Adapter Type R 300-100

replacing R 20 with R 302



Assembly:

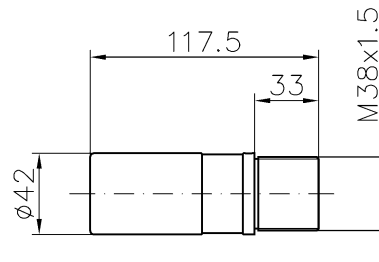


mz108505.dwg

For sensor
R 302

Order No.
216298

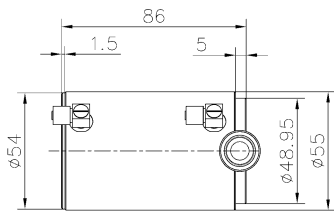
Laser pointer Type R 300-101



For sensor
R 300
R 301
R 302

Order No.
216299

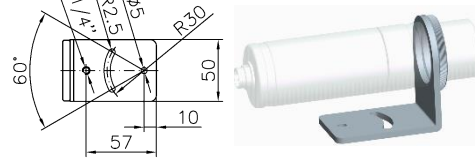
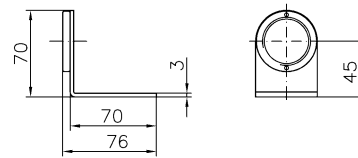
Cooling jacket Type R 300-102



For sensor
R 300
R 301
R 302

Order No.
216711

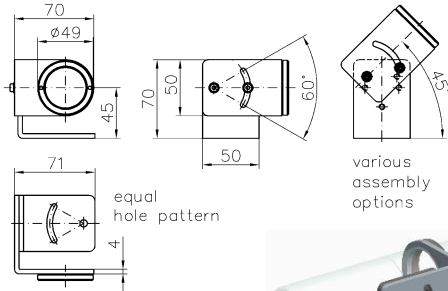
Fixed bracket Type R 300-105



For sensor
R 300
R 301
R 302

Order No.
216975

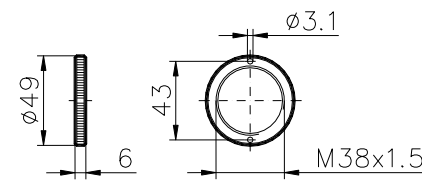
Adjustable bracket Type R 300-106



For sensor
R 300
R 301
R 302

Order No.
216976

Mounting nut Type R 300-00-024



For sensor
R 300
R 301
R 302

Order No.
216989

RS 232/HART[®] modem incl. software Type R 300-107



For sensor
R 300
R 301
R 302

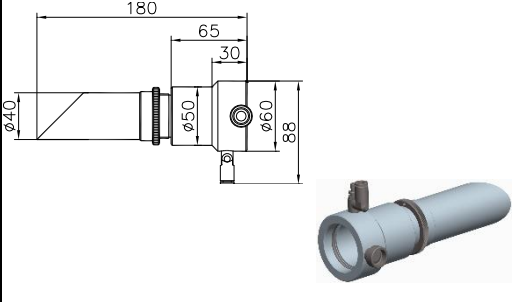
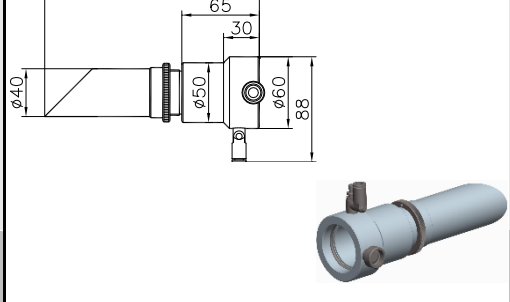
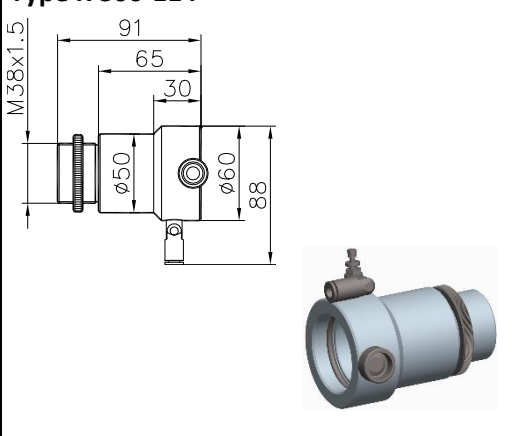
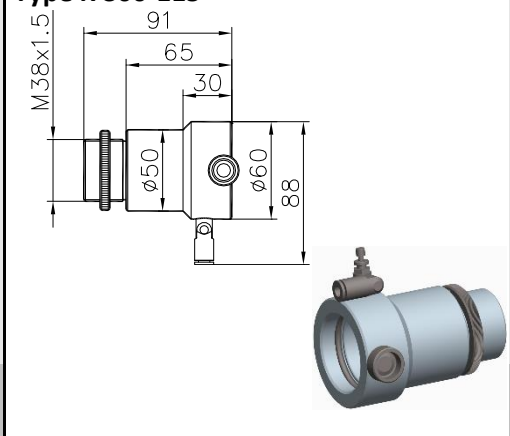
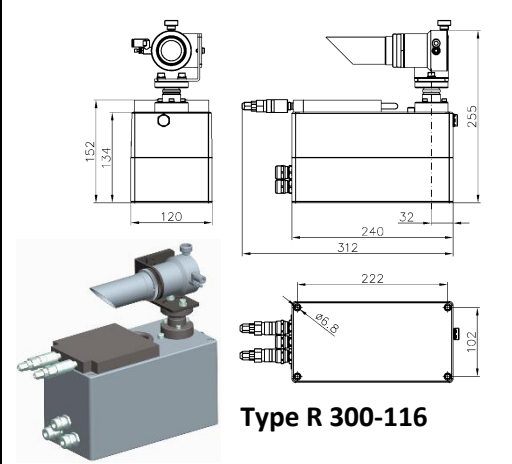


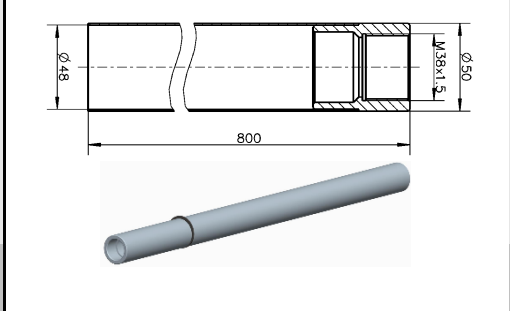
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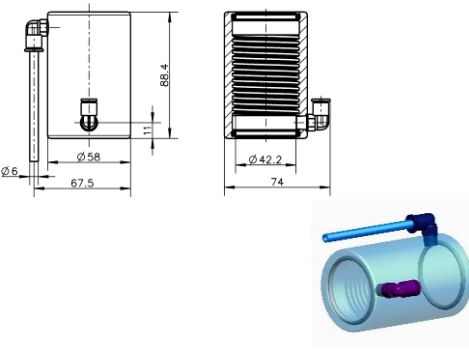
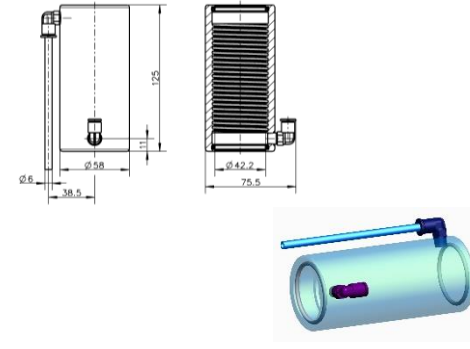
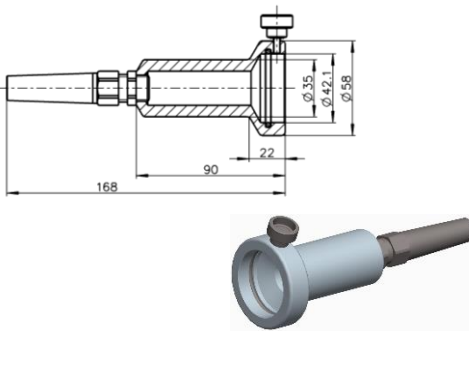
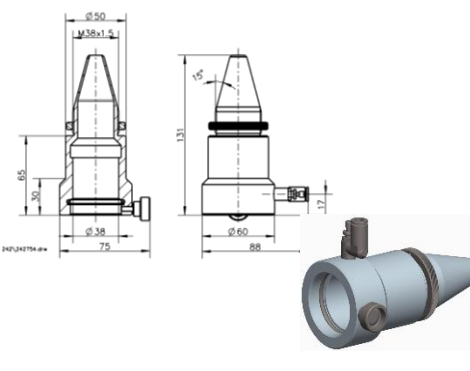



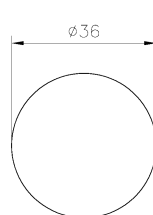
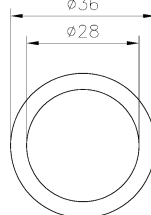
Test set for testing pyrometers R30x Type R 300-110

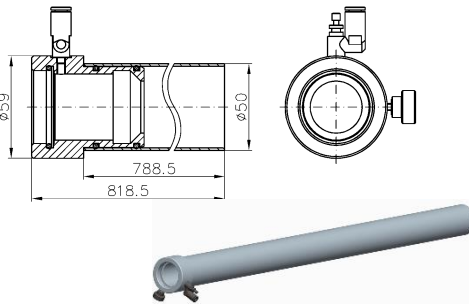
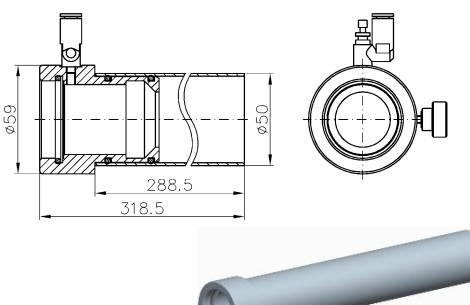
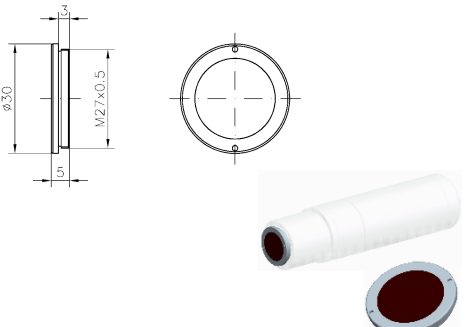




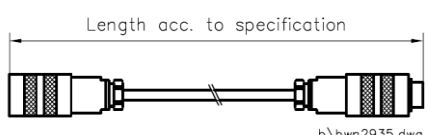


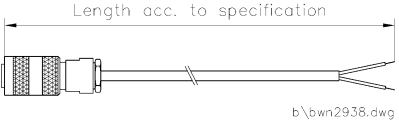
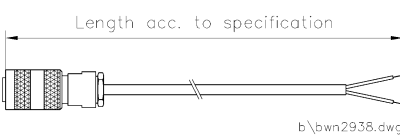
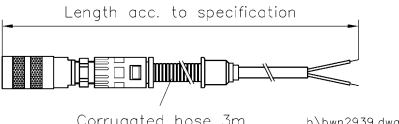
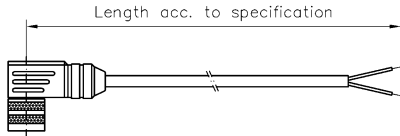
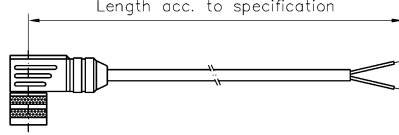
For sensor
R 300
R 301
R 302

Order No.
241933

<p>Sensor bracket with air flush Type R 300-111</p> 	<p>For sensor R 301 R 302</p>	<p>Sensor bracket with air flush (plastics) Type R 300-113</p> 	<p>For sensor R 301 R 302</p>
<p>Sensor bracket with air flush (without cable protection) Type R 300-114</p> 	<p>For sensor R 300 R 301 R 302</p>	<p>Sensor bracket with air flush (without cable protection) Type R 300-115</p> 	<p>For sensor R 300 R 301 R 302</p>
<p>Pyrometer slewing device Type R 300-116</p> 	<p>For sensor R 302</p>	<p>Connecting kit for pyrometer slewing device Type R 300-117</p> 	<p>For sensor R 300-116</p>
<p>Cooling water connecting kit for pyrometer Type R 300-132</p> 	<p>For sensor R 300-116</p>	<p>Pyrometer Protection tube (stainless steel) Type R 300-118</p> 	<p>For sensor R 302</p>

<p>Cooling jacket for pyrometer Type R 300-120</p>  <p>Order No. 279028</p>	<p>For sensor R 301</p>	<p>Cooling jacket for pyrometer Type R 300-121</p>  <p>Order No. 279027</p>	<p>For sensor R 302</p>
<p>Protective cap for pyrometer Type R 300-122</p>  <p>Order No. 279030</p>	<p>For sensor R 300 R 301 R 302</p>	<p>Sensor bracket with air nozzle (aluminium) Type R 300-123</p>  <p>Order No. 279031</p>	<p>For sensor R 301</p>
<p>USB/HART-modem incl. software Type R 300-125</p>  <p>Order No. 281175</p>	<p>For sensor R 300 R 301 R 302</p>	<p>USB/Profibus-modem incl. software Type R 300-126</p>  <p>Order No. 281176</p>	<p>For sensor R 300 R 301 R 302</p>
<p>Cleaning kit for pyrometer Type R 300-128</p>  <p>Order No. 282302</p>	<p>For sensor R 300 R 301 R 302</p>	<p>IR silicon slice with seal Type R 300-129 e.g. together with R 300-111, R 300-113</p> <p>silicon wafer</p>  <p>Flat gasket</p>  <p>Order No. 285141</p>	<p>For sensor R 301 R 302</p>

<p>Pyrometer protection tube D = 50 mm, L= 800 mm Type R 300-130</p> 	<p>For sensor R 302</p> <p>Order No. 285875</p>	<p>Pyrometer protection tube D = 50 mm, L= 300 mm Type R 300-131</p> 	<p>For sensor R 302</p> <p>Order No. 285876</p>
<p>IR safety glass Zn-Se Type R 300-136</p> 	<p>For sensor R 301 R 302</p> <p>Order No. 301954</p>	<p>Connection coupling 4-pole (axial)</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No. U233085</p>
<p>Connection coupling 4-pole</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No. U266182</p>	<p>Power supply 230 V, output 24 V DC in rail-mounting housing Type 5906-3</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No. U8901159 063</p>
<p>Power supply 230 V, output 24 V DC in surface housing Type 5906-4</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No. U8901159064</p>	<p>Extension cable, 4 pole connector and 4 pole clip, Type WN 293-5</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No. 314166 U01110822935</p>

<p>Connection cable, open ends Type WN 293-6</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No.</p> <p>3 m U01110322936 6 m U01110622936 10 m U01191022936 15 m 246691 20 m 290525 30 m 246596 40 m 246597 50 m 246598 60 m 246600 70 m 246601</p>	<p>Connection cable Ex, open ends Type WN 293-8</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No.</p> <p>3 m 245550 6 m 245551 10 m 245552 15 m 245546 20 m 280130 30 m 288916 60 m 288933 100 m 286613</p>
<p>Connection cable R3x, corrugated hose 3m, open ends Type WN 293-9</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No.</p> <p>6 m 286186 10 m 286188 15 m 286189 30 m 286190 40 m 286191 50 m 286192 60 m 286193 70 m 286194</p>	<p>Connection cable, connection coupling 90° Type WN 293-10</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No.</p> <p>35 m 294041</p>
<p>Connection cable Ex, connection coupling 90° Type WN 293-11</p> 	<p>For sensor R 300 R 301 R 302</p> <p>Order No.</p> <p>10 m 302906 60 m 290261</p>		

Order code

Model	Type	Spectral range	Measuring range
neutral	R 300	8...14µm	Default
Standard			0...200 °C
Ex zone 1/2/21/22			0...250 °C
			0...400 °C
			Setpoint
R 301		8...14µm	Default
R 302			-50...200 °C
			0...200 °C
			0...250 °C
			0...400 °C
			0...600 °C
			0...1000 °C
			Setpoint
		2...2,7µm	500...2000 °C
			Setpoint
		3,9µm	200...1000 °C
			Setpoint
		4,9...5,5µm	250...1400 °C
			Setpoint

743	30	100	
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Meaning of the order code

Select the required configuration from each column and enter the corresponding code digits in the order number fields.

Model	Neutral: Neutral rating plate Standard: BARTEC rating plate
Type	R 300 INFRAsmart IR sensor in two-wire technique with cone 1.7 : 1, for ambient temperatures up to 70 °C The 7.9 µm spectral range is only available for the R 300 type. R 301 INFRAsmart IR sensor in two-wire technique with lens 20 : 1, for ambient temperatures up to 70 °C R 302 INFRAsmart IR sensor in two-wire technique with lens 33 : 1, for ambient temperatures up to 70 °C
Spectral range	8...14 µm Possible measuring range: -50...200 °C 0...200 °C, 0...400 °C, 0...600 °C, 0...1000 °C 2...2.7 µm For steel; possible measuring range: 500...2000 °C 3.9 µm Medium temperature, glass, objects behind gases; possible measuring range: 200...1000 °C 4.9...5.5 µm For glass; possible measuring range: 250...1400 °C 7.9 µm For plastic; possible measuring range: 25...350 °C
Measuring range	Default: Maximum measuring range, not programmable Setpoint: Programmable according to customer requirement